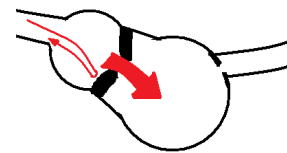


Introduction

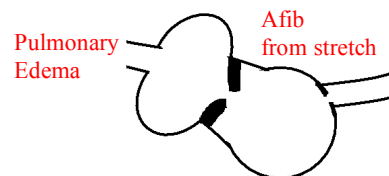
Cardiac murmurs occur as a result from **increased turbulence**. They're caused by **increased flow across a narrowed lumen** - either from a **stenotic valve** or a **regurgitant** one. The **location** and **timing within the cardiac cycle** are useful for identification of the murmur before imaging. Confirmatory diagnosis is always with **echocardiogram**. The good news is not all murmurs are pathologic. If the murmur is **< grade 3** (out of 6), **systolic**, and **asymptomatic** it needs no investigation. Any **diastolic**, **symptomatic**, or **> grade 3** requires a workup. The goal should be to identify on auscultation, understand treatment and maneuvers (which mirror one another), and then learn the nuances found on history or physical.

Mitral Stenosis

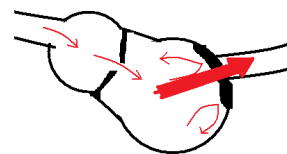
Mitral stenosis represents an **obstruction to flow** across the **mitral valve** during **diastole**. Atrial pressures are near to 0, with blood normally just falling into the ventricle. Now forward flow is impeded - blood backs up in the lungs and you get **CHF / SOB symptoms**. Because there's also an **atrial stretch**, a resultant **Afib** is possible. Caused almost exclusively by **rheumatic fever**, it's imperative that strep throat be treated appropriately. The auscultation will reveal an **opening snap** followed by a **decrescendo murmur** in **diastole** - the **worse** the stenosis the **earlier the snap**. Treatment is initiated when symptoms begin. Do not wait for congestive heart failure to set in! Because more flow = more murmur, treat this with **preload reduction**. For severe disease **balloon valvotomy** or **valve replacement** is required. If there is resultant afib, **anticoagulate** and cardiovert after the lesion is identified. Commissurotomies aren't performed anymore.



Blood backs up in the lungs + atria dilates

Aortic Stenosis

Aortic stenosis is an obstruction in getting **blood out** of the ventricle during **systole**. Because the most common cause is **calcification** (even in the case of congenital bicuspid valves, where calcification is just accelerated), and calcification takes decades to set in, this disease occurs in **elderly men**. The most common presentation is **angina, especially on exertion** (old men have coronary artery disease AND now they have calcification too). **Syncope** is classic, especially as cardiac demand increases (as in with exertion). The worst symptom is active **CHF**, implying the worst prognosis - a 1-3 year survival from diagnosis. Heard best at the **aortic region**, it's a **crescendo-decrescendo** murmur. Because it will cause hypertrophy and eventual failure (as the left ventricle pushes against an enlarged "afterload"), treatment is a must. Start with **preload reduction** so there's less to push. A **valve replacement** is required sooner rather than later. In this case, a commissurotomy or valvotomy is not possible, because the calcifications are too thick. A valve replacement will result in the **ostia** being lost; it prompts a **CABG** regardless of CAD status.



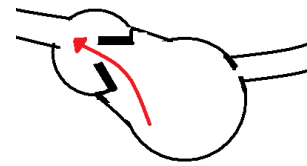
Huge afterload from stenotic valve

Makes for a **big beefy heart** that eventually **fails** leaving the heart **full of blood**

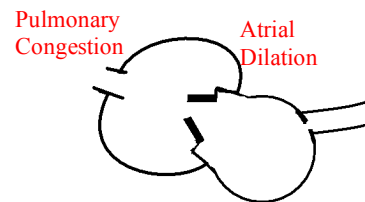


Mitral Regurgitation

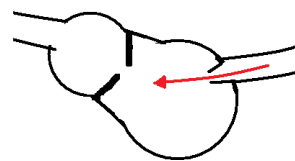
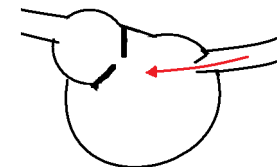
Blood should exit the left ventricle through the aortic valve. The mitral valve prevents it from going back into the atria. When the mitral valve fails, blood shoots from the high pressure left ventricle to the low pressure left atrium. This causes **atrial stretch** (potential Afib), **pulmonary congestion** (full blown pulmonary edema to CHF), and a **decreased forward flow** (cardiogenic shock). The process may be **acute** (rapid, sudden, devastating) and is a result of valve destruction. Causes include **ruptured papillary muscle** or **Chordae Tendinae** (via myocardial ischemia), **infective endocarditis**, or direct trauma. Onset will be **sudden** and the symptoms **fulminant**. Rapid identification and surgery is required. In the **chronic** (slowly developing - time for compensation) condition, usually secondary to **ischemia** or **mitral valve prolapse**, the onset is **gradual** and the symptoms are simply **exertional dyspnea** or **fatigue**. Heart failure may be controlled with normal medications, but **replace before CHF / Afib / Dilation** occur. Treat it when it's found. This is the classic **holosystolic murmur radiating to axilla** heard best at the **cardiac apex**.



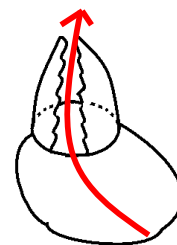
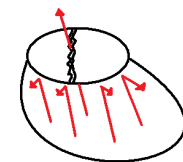
Blood shoots back into the atria

Pulmonary
CongestionAtrial
DilationAortic Insufficiency

Blood should not fall back into the left ventricle during diastole. In fact, aortic contraction maintains diastolic blood pressures. If the aortic valve is floppy (**ischemia** or **infection**) as the aorta's contractility squeezes blood, it will squeeze it back into the ventricle rather than forward into the periphery. This presents with **dilated heart failure** if chronic or **cardiogenic shock** if acute. Some end-stage findings have been characterized and named. Impress the attending with their knowledge but the valve should be **replaced** before that happens. This is a **decrescendo murmur** heard best at the **aortic valve**.

Blood pours back into the
left ventricleCardiac Dilation
+ Systolic DysfxnMitral Valve Prolapse

Generally, mitral valve prolapse is a **congenital defect** of the valve leaflets. They are **too big** for the annulus; they poosh into the atria. The murmur sounds like **mitral regurgitation** but the pathogenesis and treatment is far different. Expanding intravascular volume and allowing the heart to fill will stretch the annulus and make the leaflets fit better. Look for the **pregnant woman** (whose decreased venous return exacerbates this murmur).

Blood pooches into atria,
rather than lock, allowing
back flowExpanding the ventricle
pulls the valve together

	Murmur	Location	Leg Raise	Valsalva	Tx	Path	Presentation	Def Tx
Mitral Stenosis		Apex	Worsens	Improves	Preload Reduction	Rheumatic Fever	Afib, CHF SOB	Replace
Aortic Stenosis		Aortic to Carotids	Worsens	Improves	Preload Reduction	Calcification Bicuspid	Angina, CHF Syncope	Replace
Mitral Regurg		Apex to Axilla	Worsens	Improves	Preload Reduction	Infxn Infarction	CHF	Replace
Aortic Regurg		Aortic	Worsens	Improves	Preload Reduction	Infxn Infarction	CHF	Replace
HCOM		Apex	Improves	Worsens	Increase Preload	Congenital	SOB, Sudden Death	Replace
Mitral Valve Prolapse		Apex	Improves	Worsens	Increase Preload	Congenital	CHF	Replace